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William John Macleay — Entomological Lion?

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Synopsis

William John Macleay was a well known benefactor to the scientific community in New South Wales in the latter decades of the 1800s. He also devoted much energy to a variety of zoological subjects and published on insects, fish, amphibians, lizards and snakes.

He was well known for his work on Australian insects, primarily beetles. He published 39 papers on insects in four journals in New South Wales, South Australia and Tasmania. His entomological papers in each of the journals are summarized. His entomological contributions are discussed by analyzing the proportion of valid species to synonyms in 5 families of beetles (Buprestidae, Carabidae, Elateridae, Scarabaeidae and Tenebrionidae), accounting for more than 60 per cent of his 1360 new species of beetles. A comparison is outlined of his taxonomic works in these families in relation to those described by Reverend Thomas Blackburn.

KEY WORDS: Reverend Thomas Blackburn, William John Macleay, Buprestidae, Carabidae, Elateridae, Scarabaeidae, Tenebrionidae.

INTRODUCTION

William John Macleay (1820-1891), medical student, squatter, politician, scientist, expedition leader and a benefactor to the scientific community in New South Wales, was an important contributor to neo-colonial science in the latter decades of the 1800s. Much has been written of his life but little of his political and scientific careers has been explored. Macleay was more than a patron of science. He wrote more than 70 reports and papers on entomology, ichthyology and other zoological subjects. He was amongst the first of Australian scientists to publish his works in local journals. His major non-entomological works included the *Descriptive Catalogue of Australian Fishes* (1881) and *Census of Australian Snakes* (1884) (Hoare and Rutledge, 1974). Amongst his many accomplishments, he founded the *Entomological Society of New South Wales*, was a founder of the *Linnean Society of New South Wales* and established a museum of natural history. He provided substantial monies for a variety of scientific enterprises, some of which are still in existence.

So important were his contributions considered to the study of insects that Musgrave (1930) named his third period of Australian entomological history the Macleayan Period (1862-1929). In this address, I wish to restrict myself to his accomplishments in this field. Macleay published 39 papers on Australian insects, primarily beetles, in four journals in New South Wales, South Australia and Tasmania. A summary of his papers in each of the journals is presented (a list of his entomological papers may be found in Musgrave (1932)). His talents as a taxonomist are discussed by analyzing the proportion of his valid species to synonyms he created in five familes of beetles (Buprestidae, Carabidae, Elateridae, Scarabaeidae and Tenebrionidae). This accounts for more that 60 per cent of his 1360 new species of beetles. His colleague, Reverend Thomas Blackburn also published extensively in these five families and his efforts are compared to those of Macleay.

The Entomological Society of New South Wales

The awakening of William John Macleay's love of entomology (as early as 1858) is well documented by Fletcher (1929: 211-215). By 1862, as well as collecting in the Sydney area, he received insect collections from at least Mr E. Dämel (King George Sound, Western Australia, 1860-1861), George Masters (Port Denison area, Queensland, 1861-1862) and W. S. Wall (Rockhampton, Queensland, 1861-1862).

By 1862 Macleay had an extensive collection and, working with the earlier Macleays' collections and William Sharp's library, began to describe new species of Coleoptera — his special interest. There were no appropriate Australian journals as an outlet for local entomologists. To rectify the situation, he encouraged his colleagues to form a Society. Seven people met with him at his Macquarie Street residence on 7 April 1862, with the purpose of establishing the *Entomological Society of New South Wales*. It was resolved that William John take the chair, that a Society be formed and that William Sharp Macleay be appointed as Honorary President. He subsequently declined because of his poor health but was prepared to become a member. Fletcher (1929: 217) stated:

> The record of this first Meeting ends with the unpublished statement (from the Minute Book of the Society) that — 'A vote of thanks was unanimously given to Mr. William McLeay for his duties as Chairman, and for having been the originator of the Society.' From this it is evident that William Macleay was behind the enterprise and was the moving spirit. The Rev. R. L. King and Mr. A. W. Scott, on whose co-operation he was relying, were unavoidably absent, as they lived out of Sydney, but he was relying upon their assistance, which was forthcoming at a later stage when wanted.

The Society was instituted for the improvement and diffusion of entomological science. It consisted of Ordinary and Honorary Members and the Honorary Membership was to be conferred only on distinguished naturalists not resident in Australia.

In the resultant *Transactions*, two volumes, each of five parts, were published between 1863 and 1873. There were 37 papers and all but three were about insects and nearly all contained descriptions of new species. Six authors contributed 710 printed pages. Macleay wrote 14 papers with 524 pages (74 per cent of all pages) and King authored 12 papers with 105 pages (15 per cent). So together they accounted for 89% of the content of both volumes.

Volume 1

William John Macleay read his first entomological paper to the *Entomological Society of New South Wales* on 4 August 1862. He stated:

> The following Paper contains descriptions of Twenty hitherto undescribed species of *Coleoptera*, principally selected from a large collection of Insects, which, as I mentioned at the last meeting of this Society, I have lately received from Port Denison. I have not, however, confined myself to Insects from that locality, but have included several species from other parts of Australia, which I believe to be undescribed.

At the previous meeting (7 July 1862), he had introduced George Masters to the members of the Society and indicated that Masters had collected the Port Denison insects. Of the 20 species of tiger beetles and scarabs described in the paper, six (30 per cent) are now synonyms. This percentage of synonymy carried through most of his treatment of insect taxonomy papers of the families I have reviewed.

His next paper (read 1 September 1862) was the description of 20 new species of Buprestidae and 16 species were from Port Denison, apparently collected by George Masters. His third paper newly described 13 species of Carabidae and recorded a further 24 species. This paper showed he had a very reasonable command of the knowledge and literature of this family and he stated:

> I propose in the following Paper to describe all the new species of the family which I have been enabled to procure, and at the same time, for the convenience of the Student, to recapitulate, and give the specific descriptions of all those previously known.

He also described a new genus but it was later placed in synonomy by T. G. Sloane in 1896.

In the *Proceedings* read on 30 January 1863, he gave his first presidential address and stated:

> The advantages which the promoters of the Institution anticipated were of a two-fold character. They wished to give all who were interested in the Science of Entomology opportunities of social intercourse; and they also wished to be the means of assisting in the publication of such Papers connected with the Science as might be deemed worthy of their sanction.
>
> Viewing these as the main objects of the Society, I think I am justified in saying, that it has already been as successful as its most sanguine promoter could have desired.

In his next paper (read on 2 March 1863), also in the *Proceedings*, he described three new species of scarab beetles from Port Denison, north Queensland.

His second presidential address was read on 7 March 1864 and he laid before the Society a brief summary of the earlier history of Australian entomology. His second paper in 1864 contained 17 new species of scarabs and recorded 9 additional species. Once again, this paper shows that he had a good knowledge of the family, possibly based on the fact that Scarabaeidae was the family that William Sharp Macleay had extensively studied. He made an interesting comment on his cousin's Quinary Theory.

> Without attempting to explain the very ingenious system of classification which Mr. MacLeay has the merit of originating, I will merely refer to the "*Horae Entomologicae*" in so far as it may be necessary to show the relative positions of the *Glaphyridae* and *Melolonthidae*.

Two new genera were proposed, one is still valid, the other is now in synonomy.

His third paper in 1864 contained new descriptions of 50 species of beetles. This was the first time that he covered Coleoptera in a broad sense, describing beetles in seven families. All species but one were collected from the Port Denison area by George Masters more than a year earlier. He proposed four new genera in the family Carabidae and two are still valid and two are now in synonomy, one of which was synonymized with a William Sharp Macleay genus by Chaudoir in 1878. This paper also contained his first plate containing four figures of mouthparts of carabid beetles.

In the fourth 1864 paper Macleay showed his continued interest in Carabidae. Some 27 species were newly described from a collection received from Mr E. P. Ramsay, sent by Mr T. G. Waterhouse of South Australia. This paper contained his first key (to the genus *Carenum*) and was written both in Latin and English.

Macleay's first 1865 paper (read 6 June 1864) described a new genus and species (both names are still valid) of a minute apterous carabid. He and George Masters collected five specimens a few weeks before near Wollongong. This was the first species of blind beetle known from Australia. He named it after his friend W. J. Stephens, the Treasurer of the Society. His roughly drawn second plate included a drawing of the whole insect, mouthparts, fore leg and antenna. This was the last illustration in his insect papers.

The second paper in 1865 contained descriptions of 31 new species of carabids from various localities in Australia with many specimens coming from F. G. Waterhouse, South Australia. It included a new genus, still valid, and had a revised key to *Carenum* with a complete catalogue of Australian Scaritidae (now = Scaritinae, Carabidae).

His next 1865 paper (read 7 August 1865) was by far his longest (100 pages) to this time and completely switched from his beloved carabids to weevils Amycteridae (now = Amycterinae, Curculionidae). He described 135 new species and recorded another 40. It is surprising that he would have worked on such a difficult group, considering his friend F. P. Pascoe, London, was studying this family extensively. But he relied extensively on William Sharp's collection and stated:

> I am aware that in undertaking the task of describing and rearranging this large sub-family, I labour under the disadvantage of being unable to refer to and in some cases to identify, the

> many species described by Schönherr and Boisduval, a disadvantage difficult to overcome in the case of the last named author, as most of his descriptions are utterly useless for the identification of the species.
>
> On the other hand, I may lay claim to advantages superior to those of any other person, in the possession of the magnificent collection of the late W. Sharp MacLeay, Esq., which contains nearly 200 species allied to *Amycterus*.

This was the first time that William Macleay offered an opinion on the ability of a fellow insect taxonomist.

His next three efforts were notes published in the *Proceedings*. The first (read 2 October 1865) was a subjoined list of Lepidoptera from Cape York, presented to the Australian Museum by Mr Moore of H.M.S. *Salamander*, and which had been exhibited by Mr Gerard Krefft at a previous meeting of the Society. The list contained 24 species of butterflies and moths of which seven were newly described by Macleay. In a note directly following this one, he described two new species of carabids, both of which are still valid. In the third of these notes (read on 4 June 1866), Macleay exhibited four species of butterflies and moths from a Port Denison collection sent to him by Mr E. Dämel. He also exhibited and described four new species of carabids; only one of these is now in synonomy.

The last paper he published in the first volume of the *Transactions* was a continuation of his previous Amycteridae paper. The 29 new species were based on collections made at Port Lincoln and King George Sound by George Masters.

Volume 2

There was a three year break between the last part of volume 1 and the first part of volume 2. Macleay described 20 new carabid species in the seventh paper in volume two; he also took two colleagues to task for their apparent misinterpretations of genera and species in this family.

The next two papers he published were a radical departure from previous efforts because a broad spectrum of families were covered. These are the two very large papers of the insects from Gayndah (Queensland), based on material collected by George Masters. In the first of these papers he stated:

> I have always hitherto in describing new genera and species, adopted the system most usual with English Entomologists of giving these descriptions in Latin. On this occasion I intend to depart from that rule, as I believe that many of those who take an interest in Australian Entomology, will infinitely prefer the descriptions given in plain and intelligible English.

This departure from the usual species description format must have been a significant contribution to entomology, especially amateurs. In these two papers, he recorded 697 species and newly described 554 of them in 49 families. It is quite surprising that he described 20 new species in Anthicidae, Pselaphidae and Scydmaenidae because his good friend, Reverend R. L. King from Parramatta, was actively describing species in these families of very small beetles.

In the last paper in the *Transactions*, entitled *Miscellanea Entomologica*, Macleay newly described 81 beetles in 4 familes and one ant. The paper was appropriately titled because it represented a mixture of disassociated notes. But it contained more biological and collection information than any of his previous papers. It is interesting that he reverted to the English style of describing species, including a Latin description before the English description. Perhaps he felt the inclusion of Latin descriptions for his two Gayndah papers published previously was too daunting a task. But this was the last insect paper in which he included Latin descriptions.

The Linnean Society of New South Wales

William Macleay was a founder of this Society, established in 1874 for 'the cultivation and study of the science of Natural History in all its branches.' (Walkom, 1925). It

was during this year that Macleay decided to retire from active politics, enlarge his collections to all branches of natural history and hired George Masters as his curator. The establishment of the *Proceedings* in 1877 created a venue for his interests other than insects. But he did publish 18 insect papers (307 printed pages) between 1881 and 1888.

Macleay's first Australian insect paper in *Proceedings of the Linnean Society of New South Wales* was published in 1878; five years had elapsed since his last insect paper in the defunct *Entomological Society of New South Wales*. He described four species of carabids, returning to his favourite family of beetles. He stated:

> . . . I received from Mr Spalding a large and valuable collection of Mammals, Birds, Reptiles, Fishes, Mollusks, Crustacea, Insects, and other animals, both terrestrial and marine, from Port Darwin . . .
>
> I propose to undertake, on my own part, an account of the Fishes, Lizards, and Snakes, but want of time makes me limit myself in the present Paper to a short notice of the Coleoptera in the collection belonging to the Family *Carabidae*. I select this Family, not only because it is to me the most interesting, . . .

This verifies his interest in carabids and is a published reference to his interests in vertebrates. I believe these interests took him away from his intensive study of insects for the rest of his life.

His next two papers were interesting deviations from his usual style of solely describing insects. Though a new species of leaf-feeding stick insect was described in the first paper, he also provided an extensive discussion on the biology of this stick insect family. In addition he gave a potential method for control of these possible pests — the first time that he had entered the arena of economic entomology:

> If it should be found that the ravages of this or any other species of the *Phasmatidae* are the causes of the wide-spread destruction of trees now going on in many parts of the colony, it will, I think, be a simple matter to limit, where the timber is of sufficient value, the extent of the injury by clearing a wide belt round infested areas.

Even at that early date, defoliation of timber-trees was of concern. The new stick insect was found in amazing numbers near the Binda Caves by C. S. Wilkinson, Government Geologist. The trees for miles around were completely denuded of leaves, and dead and dying insects were lying beneath the trees in heaps.

The second of these 'economically-oriented' papers concerned the havoc wreaked on grape-vines by a weevil. The larvae of this beetle caused extensive damage to the young wood of the vines, but also ate into the old wood and roots. He offered a practical means of control that is still used today:

> There can, I should say, be very little difficulty under such circumstances, in keeping down the number of these insects, a little care in the pruning season in cutting out all the infected branches, and the immediate burning of them, would almost ensure the complete destruction of the pest, if their ravages were confined to the Grape Vine, but as I mentioned before, there may be other plants or trees liable to their attack, and to ascertain what these are, must necessarily accompany any effort to clear an orchard of the insects.

All but one of the remaining Macleay papers in the *Proceedings* reverted to his traditional style of describing species. His 1883 paper described some species of Coleoptera in the Brisbane Museum, sent to him by Mr De Vis. There was quite a problem associated with this collection (one that I am confronted with even today with the Macleay collections):

> . . . sent me lately some hundreds of species of Coleoptera (which he had picked out of the Museum collection), without name, and in most instances without any indication of locality or even country. He sent them in the hope that I might be able, by reference to my very large collection in that branch of Natural history to furnish him with the names of some of them at least. This, I am glad to say, I shall be enabled to do, to a very considerable extent, but it is a work that demands time, and it will probably be weeks before I shall have got entirely through the collection.

He described only nine species of carabids and four scarab beetles from this collection.

Macleay's three 1885 entomological papers in the *Proceedings* tackled a very difficult group – the stag-horn beetles of the genera *Lamprima* and *Neolamprima* (Lucanidae). In the first paper, he described 7 species, five of which are now synonyms. Even today, these genera remain in taxonomic chaos because of the apparent extreme variability shown in the species. His second paper was more successful; he described one new genus and two new species, all of which are valid today. The third paper created a new genus for one species described earlier in the year. His original description was based on a female but Mr C. French of the Botanical Museum of Melbourne, later sent him a male and a new genus had to be created. The sexes are dimorphic in the stag-horn beetles and the generic classification is generally based on males. Britton (1970) stated that this species, *Phalacrognathus muelleri*, is the most attractive of all Australian Coleoptera.

Macleay's next three papers in the *Proceedings* were all entitled *Miscellanea Entomologica*. The reason for the title of these papers was stated by Macleay:

> It is now within a few months of thirteen years, since I published in the Transactions of the Entomological Society of New South Wales, a paper under the above title. I adopt the same prefix now, because my intention and objects are the same as on that occasion. It was my wish then as now, to describe from time to time such new or little known species of insects as I came across in my collection, and, to render such descriptions more interesting and instructive to the Entomologist, to accompany them with a review or revision of the genus or group to which each species belongs.

But two of these three papers differed markedly from his first 'miscellanea' paper because he discussed all known species in the genera *Diphucephala and Liparetrus* (Melolonthinae: Scarabaeidae). His coverage was thorough and his work would be most acceptable today if keys and illustrations had been included. The third paper in this series reverted back to his favourite carabids. He attempted to better define genera in Scaratinae and stated:

> I have been compelled in my effort to make my revision of the group as distinct and intelligible as it is in my power to make it, to add considerably to the number of genera, so that by my present proposed arrangement the genus *Carenum* of Bonelli, yields material for 14 genera. My definition of these, given below, is short and not very definite, but that I find unavoidable, as there are very few marked distinguishing features in the group, and even these run into one another in the most puzzling manner.

He listed species included in each genus but provided no key or illustrations, leaving this group in a much better condition than he found it but still in a confused state.

The next two papers reverted to the style of the Gayndah papers. He described insects in 14 families; they were from Cairns and its neighbourhood (Barron River, Mossman River, Mulgrave River and Russell River) and collected by W. W. Froggatt.

Then followed two *Miscellanea Entomologica* papers on Tenebrionidae. Macleay treated 132 species but only described 41 species. As in his two previous papers on Melolonothinae, he was most careful to survey and summarize the literature of the '*Helaeides*', contributing to a better understanding of part of this large family. I believe these four *Miscellanea Entomologica* papers are the best that he published on Australian insects.

The last four papers published in 1888 were based on several collections sent to him. The first were some of carabids (Scaritinae) brought to him by Mr George Barnard, of Coomooboolaroo, Upper Dawson River. He identified 11 species and described two new species. The last three papers reported on the Froggatt collections:

> Mr. Froggatt, the well-known New Guinea Explorer, left Sydney in March last, in making a collection for the Macleay Museum of the zoological productions of that part of Australia.

In the first of these three papers, no new species were described. It was a summary of zoological specimens collected by Mr Froggatt and how they related to the fauna of the

rest of Australia. The last two papers included the descriptions of 108 species in 6 families of beetles. Thus closed the Australian entomological career of William John Macleay.

Other Journals

Transactions and Proceedings of the Royal Society of South Australia

In 1885, Macleay published 3 short notes in *Miscellaneous Contributions To The Natural History Of South Australia*, edited by Professor R. Tate. This was a curious mixture of insects: a scarab, a weevil and a stag-horn beetle. Each note is only 3-6 lines long and contains references to their possible economic significance. What prompted him to make these nearly insignificant contributions remains a mystery. There is no known correspondence of Macleay in either the archives of the Royal Society of South Australia or the South Australian Museum to shed light on this question.

Papers and Proceedings of the Royal Society of Tasmania

His 1886 paper in this journal was entitled *Zoology of Australia*. It contained no species descriptions and was a totally different paper from any other that he wrote. He used A. R. Wallace's definition of the Australian Region, 'The Islands of New Holland and Tasmania' as a basis of his review of the known knowledge of most animal groups. His classification of the vertebrates and invertebrates was indeed quaint. He divided these groups into sub-kingdoms. He started with sub-kingdom Vertebrata which included the mammals and marsupials, followed by birds, reptiles, and amphibians. There was a very long review (more than seven pages) on the fishes, which is not surprising since this group was his principle interest at the time.

The sub-kingdom Mollusca was not treated in depth because he felt:

> There is less, however, in the Mollusca than in any other sub-kingdom of the Animalia of a peculiarly Australian character to be observed, — in fact, except in one or two not very important peculiarities, there is nothing to separate the region from the rest of the world.

His third sub-kingdom, the Arthropoda, included an interesting mixture of groups. The insects were reviewed in depth, particularly Coleoptera. He believed there were 'quite 10,000' species and believed that 'in a few years' time thousands may be added to that estimate'. But by 1970, there were only 19 219 species known from Australia (Britton, 1970: 517). So discovery of additional species did not increase at the rate that Macleay anticipated. The knowledge of the spiders, mites, ticks and millipedes and Crustacea were dispensed with in two short paragraphs. His fourth sub-kingdom, the Vermes and rotifers, were also dealt with summarily.

The introductory remarks given for his fifth sub-kingdom, Echinodermata, are interesting:

> . . . are exclusively Marine Animals, and in a country with an extensive seaboard and a favourable climate like Australia, might be expected to hold a predominating position, and they do so.

Yet for the Mollusca he held the opposite view (quoted above).

His comments for his last sub-kingdom, Protozoa,

> . . . may be passed over: they are much the same everywhere. The Australian representatives of the various classes comprising the Sub-kingdom have never been investigated.

What prompted Macleay to write this review is unclear, but I believe that it was the influence of Reverend Tenison-Woods. The Reverend Tenison-Woods spent the years 1874-1876 in Tasmania. O'Neil (1929) stated '. . . Mr, afterwards Sir William, Macleay — a scientific colleague of Father Woods, who became his devoted friend.' In 1878, Reverend Tenison-Woods joined the *Linnean Society of New South Wales* and the Union

Club at Sydney, remaining a member of this Club until his death in 1889. So there were ample opportunities for these two gentlemen to meet.

William John Macleay Australian Insect Species

Macleay described 1360 new species of beetles in 52 families (as known in his day): Carabidae (339 species), Scarabaeidae (274), Curculionidae (164), Tenebrionidae (105), Elateridae (71), Buprestidae (63), Staphylinidae (60) and 29 or fewer species in each of the remaining families. Five of the larger families (Buprestidae, Carabidae, Elateridae, Scarabaeidae and Tenebrionidae) are discussed to give a partial idea of his success as a taxonomist by determining how many of his species are now synonyms. The taxonomic efforts of one of his colleagues, Reverend Thomas Blackburn (1844-1912), are compared to Sir William's to give a very general idea of the accuracy of taxonomic decisions of both entomologists in these five families. Their efforts are summarized in Tables 1 and 2.

The Curculionidae (weevils) is the largest family of organisms (plant or animal) and there are no recent catalogues to bring his species names up to date. The catalogue situation is similar for the very large family Staphylinidae (rove beetles), hence these two families unfortunately cannot be discussed.

Coleoptera

Buprestidae

Commonly known as jewel beetles, there are about 850 species in Australia. Many of the species are brilliantly coloured and are eagerly sought after by collectors world-wide. Large specimens of *Castiarina*, *Temognatha* and *Stigmodera*, particularly from Western Australia, are very popular (Macleay described 14 species from that state). The adults are usually found on flowers, seeking nectar. The larvae of most species feed in recently dead wood, producing characteristic flattened burrows, hence they are sometimes called flat-headed wood boring beetles.

Macleay described 63 species in this family. Of his synonyms (32 per cent of his described species), 18 were described by authors other than Macleay; two species are synonyms of Macleay's previously described species (Barker, 1988; Carter, 1929; Gardner, 1990). Blackburn faired little better – 32 per cent synonyms with four of Macleay's previously described species and three of his own.

Carabidae

There are more than 1700 species of ground beetles described from Australia. They are found under rocks, logs and bark and in leaf litter. Most species are nocturnal and some are attracted to lights. Nearly all predate on other invertebrates and can be very beneficial in controlling pest insects in crops. The larvae are also predacious and occur in soil, under bark or in debris.

Between 1862 and 1888, Macleay described 339 species of Australian carabids. Of his synonyms (36 per cent), 85 were described by authors other than Macleay and 38 species (31 per cent) are synonyms of Macleay's previously described species (Moore *et al.*, 1987). This is a very high number of his own synonyms, considering that he would most likely have had specimens of his previously described species in his collection. He had particular trouble with *Carenum*. Of the 76 species Macleay described in this genus, 33 (43 per cent) are now synonyms. He created seven unnecessary names for *Carenum scaritodes* Westwood, 1843 and seven for *Carenum tinctilatum* (Newman, 1838) alone! He also erected four unnecessary names for one of his own species, *Carenum interruptum* Macleay, 1865. Blackburn newly redescribed ten of Macleay's species and three of his own. There appears to have been little or no exchange of type specimens for study

TABLE 1

Species described in five families of Coleoptera by William John Macleay

	Buprestidae	Carabidae	Elateridae	Scarabaeidae	Tenebrionidae
Number of species described	63	339	71	274	105
Number unchanged	18	130	24	133	47
Number transferred to other genera	25	87	35	51	33
Number of synonyms	20	122	12	90	25
Per cent synonyms	32	36	17	33	24

TABLE 2

Species described in five families of Coleoptera by Reverend Thomas Blackburn

	Buprestidae	Carabidae	Elateridae	Scarabaeidae	Tenebrionidae
Number of species described	124	165	49	632	211
Number unchanged	33	80	25	442	138
Number transferred to other genera	46	50	20	95	20
Number of synonyms	45	35	4	95	53
Per cent synonyms	36	21	8	15	25

between these two entomologists. I have been unable to find any correspondence between them but it may exist. Macleay's species descriptions were abbreviated and there were few remarks comparing his new species with previously described species. Perhaps this led Blackburn to create so many synonyms of Macleay's species.

Elateridae

The adults of this family have a unique click mechanism which enables them to right themselves if disturbed. Hence they are known as click beetles. There are more than 600 described species of this family in Australia. Adults are phytophagous and may be found on flowers, under bark or on vegetation. Larvae are mostly root feeders but some are carnivorous. Included are the well-known wireworms which are pests of vegetable crops, cereals and grasses.

Macleay described 71 species of click beetles. According to Neboiss (1956), six of his synonyms were previously described by Candèze in his four part *Monographie des Élatérides*. Macleay had these works (his personal copies are now in the rare book section of the Fisher Library). However there are no known exchanges of specimens or correspondence between Macleay and the Belgian entomologist who described many Australian click beetles. Both Blackburn and Macleay had low numbers of synonyms in this family. Blackburn created only one synonym from a Macleay species and none of his own.

Scarabaeidae

These are commonly known as Christmas, dung, or scarab beetles and more than 2200 species have been described from Australia. They have a great diversity of habits; many are on dung, decaying plant material, carrion, and roots. Some live in ant or termite nests and a few feed on fungi. Most feed on grasses, foliage, fruits and flowers and some larvae are serious pests of lawns and agricultural crops.

Macleay described 274 species of scarabs. According to Cassis *et al* (1992) and Houston *et al* (1992), 133 of his species names are unchanged, 51 have been transferred to other genera and 90 are synonyms. These numbers most likely will change when several

large genera are revised: *Diphucephala* (22 Macleay species), *Heteronyx* (21 Macleay species), *Liparetrus* (79 Macleay species) and *Onthophagus* (37 Macleay species). Of the synonyms (33 per cent of his described scarabs), 60 were described by other authors (including two by William Sharp Macleay and three by George Masters); 30 species are Macleay's previously described species. This is a very high number of his own synonyms indeed. Blackburn created synonyms for 18 of Macleay's species and 31 of his own!

Tenebrionidae

In this very large world-wide family, commonly known as darkling or stink beetles, there are nearly 1300 species described from Australia. They are particularly well adapted to arid areas and most feed on plant materials of many kinds. A few are common pests of stored grains and their products and can be very destructive. A most interesting group in Australia is the 'pie-dish' beetles, especially *Helea* and *Pterohelaeus*. They are remarkably flattened with a broad flange around the outer margins of the fused elytra. Macleay described 31 species in these two genera.

Altogether, he described 105 species of Tenebrionidae (the family as understood in his day). (Recently Alleculidae and Lagriidae have been included as subfamilies in Tenebrionidae and are not discussed here). According to Carter (1926) and Doyen *et al* (1989) 47 of his species names are unchanged, 33 have been transferred to other genera and 25 are synonyms. These numbers will undoubtedly change when the large number of *Pterohelaeus* are revised (28 Macleay species). Of the synonyms (24 per cent of his described species), 23 were described by authors other than Macleay; two species are synonyms of Macleay's previously described species. Of the 23 previously described species, 11 were described by Pascoe. Macleay and Pascoe (in London) corresponded and exchanged specimens and papers extensively. In fact Macleay established five Pascoe patronyms in Tenebrionidae. It is a wonder that Macleay re-described so many of Pascoe's species. Blackburn redescribed five of Macleay's species and 13 of his own.

Hymenoptera

Surprisingly, Macleay (1873) described one species of ant. It was collected in the spring of 1872 while he and Masters were on an entomological excursion to the Murrumbidgee. They found a new species of a very small beetle (Pselaphidae) which was frequently found in the society of a small red ant. He stated:

> So invariably was the association that whenever on turning over a log we found some of the ants we knew that a search in their passages would certainly lead to the discovery of some of these attendant beetles.
>
> The ant answers very nearly to the genus Ectatomma of F. Smith. It is undescribed, I give it therefore a name and description.

But unfortunately it did not prove to be a new species and Taylor and Brown (1985) synonymized it with *Brachyponera lutea lutea* (Mayr, 1862).

Lepidoptera

In 1866, Macleay published his only paper on skippers, butterflies and moths. He described seven species: Hesperiidae (skippers), 1 species; Lycaenidae (copper and blue butterflies), 1 species; Nymphalidae (brush-footed or four-footed butterflies), 2 species; Noctuidae, Agaristinae (forester moths), 2 species; Sphingidae (hawk moths) 1 species. One species retains its original name, three species are now subspecies, transferred to genera differing from those to which they were originally designated when described and three species are synonyms (T. Weir, pers. comm., 1991).

Phasmatodea

Macleay (1881) described one species of a stick insect, *Podocanthus wilkinsoni*. Vickery (1983) listed it as a valid species and the male lectotype (designated by Key, 1960) is in the Australian National Insect Collection, Canberra.

Reflections

Macleay published 33 taxonomically oriented papers. He described 1360 species of beetles and the number of synonyms he created was high, especially of species he had previously described. If he had taken more time and care, the synonyms of his species should have been very low, if not absent altogether, because he retained representatives of most of the species he had previously described. A very high number of his species have been transferred to genera other than those to which he first assigned the species. This apparently shows that he did not have a good command of the higher classification of Coleoptera. Though he concentrated on species in seven families (1080 species), he also described species in 45 other familes. Perhaps it would have been better for him not to have been an entomological polyhistor but to have concentrated on one family, particularly Carabidae, his pronounced favourite group. He did describe new genera but many of these were later synonymized. He had no apparent desire to delve into the higher classification of insects as did his cousin William Sharp Macleay. Only three of his taxonomic papers had keys to species or illustrations. This would have severely hampered others who did not have access to his collections.

In comparison with Blackburn's taxonomic works, Macleay faired less well (Tables 1 and 2). But at least Macleay provided a foundation for others to follow. Later entomologists who were influenced by Macleay, such as H. J. Carter and A. M. Lea, were more accurate in their taxonomic decisions. This trend continues today with better techniques available such as the greater use of genitalia to separate species and better microscope techniques. Furthermore, there is now better communication between scientists and regular exchange of type specimens between taxonomists.

It is not common for insect taxonomists to criticize their fellow workers. But Fauvel (1877: 170-171) took Macleay to task for not publishing his descriptions in Latin and commented on his taxonomy (my translation of his French text):

> . . . However, single works published by these authors have the character and importance of a local fauna. Such a one is M^{r} William Mac Leay who published in English in volume II of the *Transactions of the Entomological Society of New South Wales* (read 3 April 1871) with the title: *Notes on a collection of Insects from Gayndah*, a town on the Burnett River, in northern Australia (Queensland). Unfortunately the new species descriptions in this paper, at least for Staphylinidae, are inadequate, obscure and never comparative, and they will come to be synonyms almost without exception when one understands the types to which they apply. The genera are not, however, better treated than the species, and the two the author indicates as new: *Myrmecocephalus* and *Pinobius*, are synonyms of *Falagria* and *Dolicaon*. So what confidence can we give to an author who describes Staphylinidae and does not recognise even one of the genera most characteristic and most common of the family, the *Falagria*. It is sad to have to register this work among the deplorable which seem to date from the 18th century.
>
> Of the few I have been able to examine the types of M^{r} W. Mac Leay, I have given a new description in Latin: but it is not easy to obtain insects from Gayndah and the collection made by M^{r} Masters from this locality are nearly all in Australia. . . .

Fauvel obtained his few Macleay type specimens from 'M^{r} De Castelnau' from Melbourne.

On the brighter side, his four *Miscellanea Entomologica* papers of 1886-1888 are examples of well-written and detailed treatises on the groups covered. In my opinion, they were so good that they would be very acceptable by today's standards if keys and

illustrations were provided. Macleay's founding of the *Entomological Society of New South Wales*, his financial and editorial support and his entomological contributions to the journal were of considerable value. His resolve, stated in one of the papers in this journal, not to include Latin descriptions with his new species surely had a beneficial effect on entomologists following in his footsteps (at least in Australia).

Macleay's interest, especially his financial support, in establishing and maintaining the *Linnean Society of New South Wales* was of estimable value. Though most of his written contributions in the *Proceedings* of the Society were non-entomological, he still contributed to the knowledge of Australian insects.

Macleay actively encouraged others to study insects. He seemingly was always available to give advice and support, and his collections were freely available for study. Perhaps these were amongst his most worthy accomplishments because there were several successful entomologists that followed in his footsteps such as Blackburn, Carter and Lea and were influenced by him. In my opinion, he was not a particularly noteworthy insect taxonomist, but in reviewing all of his accomplishments in the entomological field, he was most certainly an entomological lion.

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